10:45:06 OCA PAD INITIATION - PROJECT HEADER INFORMATION 04/12/90

Active

Project #: G-33-683 Cost share #: Rev #: 0
Center # : 10/24-6-R6697-2A0 Center shr #: OCA file #:
Work type : RES
Contract#: 5 R29 AI24905-02 Mod #: Document : GRANT
Prime #: Contract entity: GTRC

Subprojects ? : N
Main project #:

Project unit: CHEM Unit code: 02.010.136
Project director(s):
IKEDA R A CHEM (404)894-4037

Sponsor/division names: DHHS/PHS/NIH / NATL INSTITUTES OF HEALTH
Sponsor/division codes: 108 / 001

Award period: 900301 to 910228 (performance) 910531 (reports)

Sponsor amount	New this change	Total to date
Contract value	102,352.00	102,352.00
Funded	102,352.00	102,352.00
Cost sharing amount		0.00

Does subcontracting plan apply ?: N

Title: THE MOLECULAR BASIS OF FUNCTION OF T7 RNA POLYMERASE

PROJECT ADMINISTRATION DATA

OCA contact: Kathleen R. Ehlinger 894-4820

Sponsor technical contact

DR. ROBERT L. QUACKENBUSH

GENERAL BACTERIOLOGY PROGRAM
BACTERIOLOGY & VIROLOGY BRANCH
NIH/NAID BLDG. 753 A, RM. 8285
BETHESDA, MD. 20892

Sponsor issuing office

MRS. LOUISE KREH
(301)496-7075
DHHS/PHS/NIH/NIAID
9000 ROCKVILLE PIKE
BETHESDA, MD. 20892

Security class (U,C,S,TS) : U ONR resident rep. is ACO (Y/N): N
Defense priority rating : N/A NIH supplemental sheet
Equipment title vests with: Sponsor GIT X

Administrative comments -
INITIATION OF YEAR 2 OF 5 YEAR PROJECT. CONTINUATION OF G-33-654.

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

NOTICE OF PROJECT CLOSEOUT

Closeout Notice Date 04/17/91

Project No. G-33-683 Center No. 10/24-6-R6697-2A0

Project Director IKEDA R A School/Lab CHEMISTRY

Sponsor DHHS/PHS/NIH/NATL INSTITUTES OF HEALTH

Contract/Grant No. 5 R29 AI24905-02 Contract Entity GTRC

Prime Contract No.

Title THE MOLECULAR BASIS OF FUNCTION OF T7 RNA POLYMERASE

Effective Completion Date 910228 (Performance) 910531 (Reports)

Closeout Actions Required:	Y/N	Date Submitted
Final Invoice or Copy of Final Invoice	Y	
Final Report of Inventions and/or Subcontracts	N	
Government Property Inventory & Related Certificate	N	
Classified Material Certificate	N	
Release and Assignment	N	
Other	N	

Comments ANNUAL FINANCIAL REPORT REQUIRED. CONTINUED BY PROJ. G-33-620
PATENT REPORTING IN FINAL YEAR OF GRANT.

Subproject Under Main Project No.

Continues Project No. G-33-654

Distribution Required:

Project Director	Y
Administrative Network Representative	Y
GTRI Accounting/Grants and Contracts	Y
Procurement/Supply Services	Y
Research Property Managment	Y
Research Security Services	N
Reports Coordinator (OCA)	Y
GTRC	Y
Project File	Y
Other	N
	N

SECTION 1

6-33-683

Form approved through 3/31/91
OMB No. 0925-0001

231

DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE

APPLICATION FOR CONTINUATION GRANT

REVIEW GROUP	TYPE	ACTIVITY	GRANT NUMBER *(Insert on all pages)*
MBC -2	5	R29	AI24905-03

TOTAL PROJECT PERIOD
From: 03/01/89 Through: 02/28/94

REQUESTED BUDGET PERIOD
From: 03/01/91 Through: 02/29/92

To be verified by applicant. Check information in items 1 through 6. If incorrect, furnish correct information in item 13.

1. TITLE OF PROJECT
MOLECULAR BASIS OF FUNCTION OF T7 RNA POLYMERASE

2a. PRINCIPAL INVESTIGATOR OR PROGRAM DIRECTOR *(name and address, street, city, state, zip code)*
IKEDA, RICHARD A
GEORGIA INST OF TECHNOLOGY
SCHOOL OF CHEMISTRY
ATLANTA, GA 30332

4. APPLICANT ORGANIZATION *(name and address, street, city, state, zip code)*
GEORGIA TECH RESEARCH CORP
GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GA 30332

5. ENTITY IDENTIFICATION NUMBER
158603146A1

2b. DEPARTMENT, SERVICE, LABORATORY OR EQUIVALENT
SCHOOL OF CHEMISTRY & BIOCHEM

2c. MAJOR SUBDIVISION
COLL OF SCIS & LIBERAL STUDIES

3. ORGANIZATIONAL COMPONENT TO RECEIVE CREDIT FOR BIOMEDICAL RESEARCH SUPPORT GRANT *(see instructions)*
20 OTHER

6. TITLE AND ADDRESS OF OFFICIAL IN BUSINESS OFFICE OF APPLICANT ORGANIZATION
CONTRACTING OFFICER
GEORGIA TECH RESEARCH CORP
GEORGIA INSTITUTE OF TECHNOLOGY
CENTENNIAL RESEARCH BLDG, RM 246
ATLANTA, GA 30332-0420

Complete the following *(see instructions)*

7. HUMAN SUBJECTS
7a. ☒ NO ☐ YES { ☐ Exemption # _____ OR ☐ IRB Approval Date _____
7b. Assurance of Compliance # _____

8. VERTEBRATE ANIMALS
8a. ☒ NO ☐ YES ... IACUC Approval Date _____
8b. Animal Welfare Assurance # _____

9. PERFORMANCE SITE(S) *(organizations and addresses)*
Georgia Institute of Technology
School of Chemistry and Biochemistry
Atlanta, GA 30332-0400

10. COSTS REQUESTED FOR BUDGET PERIOD
10a. DIRECT $ 64,499 | 10b. TOTAL $ 104,811

11. INVENTIONS *(see instructions)*
☒ NO ☐ YES { ☐ Previously reported OR ☐ Not previously reported

TELEPHONE INFORMATION

	AREA CODE	TELEPHONE NO. AND EXTENSION
12a. PRINCIPAL INVESTIGATOR OR PROGRAM DIRECTOR *(Item 2a)* Ikeda, Richard A.	404	894-4037
12b. NAME OF BUSINESS OFFICIAL *(Item 6)* Matt Gedney	404	894-4817
12c. NAME AND TITLE OF OFFICIAL SIGNING FOR APPLICANT ORGANIZATION *(Item 15)* Matt Gedney, Contracting Officer	404	894-4817

13. USE THIS SPACE FOR CORRECTIONS TO ITEMS 1 THROUGH 6. INDICATE THE NUMBER(S) WHERE ANSWERS APPLY.

Item 2c should be corrected to: College of Sciences

14. PRINCIPAL INVESTIGATOR/PROGRAM DIRECTOR ASSURANCE: I agree to accept responsibility for the scientific conduct of the project and to provide the required progress reports if a grant is awarded as a result of this application. Willful provision of false information is a criminal offense. *(U.S. Code, Title 18, Section 1001.)*	SIGNATURE OF PERSON NAMED IN 2a *(In Ink. "Per" signature not acceptable)*	DATE 12/19/90
15. CERTIFICATION AND ACCEPTANCE: I certify that the statements herein are true and complete to the best of my knowledge, and accept the obligation to comply with the Public Health Service terms and conditions if a grant is awarded as the result of this application. A willfully false certification is a criminal offense. *(U.S. Code, Title 18, Section 1001.)*	SIGNATURE OF PERSON NAMED IN 12c *(In Ink. "Per" signature not acceptable)*	DATE 12/20/90

RETURN COMPLETED APPLICATION TO PHS AS SOON AS POSSIBLE:
NO LATER THAN 1 JANUARY 1991

REQUESTED BUDGET FOR NEXT BUDGET PERIOD Follow instructions carefully	FROM	THROUGH	GRANT NUMBER
	03/01/91	02/29/92	AI24905-03

A. ITEMIZE DIRECT COSTS REQUESTED FOR NEXT BUDGET PERIOD PERSONNEL *(Applicant organization only)*		1	2	3	DOLLAR AMOUNT REQUESTED *(Omit cents)*		
NAME	ROLE IN PROJECT	TYPE APPT.	% OF APPT.	EFFORT ON PROJ.	SALARY	FRINGE BENEFITS	TOTALS
Richard A. Ikeda	Principal Investigator	1.0	50	0.50	10,713	2,818	13,531
Paul Bailey	Graduate Research Assistant	0.45	100	0.45	12,654	0	12,654
Sakuntala Warshamana	Graduate Research Assistant	0.45	100	0.45	12,654	0	12,654
SUBTOTALS →					36,021	2,818	38,839

CONSULTANT COSTS *(See instructions)*		
Dr. Dwight Hall, Georgia Institute of Technology--School of Applied Biology		0
EQUIPMENT *(Itemize)*		
None		0
SUPPLIES *(Itemize by category)*		
Isotopes: 32P nucleotides, 3600; 35S Met, 1200; 3H Amino Acids, 1800		6,600
Enzymes: Restriction Enz, 2400; Other Enz, 1200		3,600
Chemicals: Media, 1500; CsCl, 500; Buffers, 750; Urea, 500; Acrylamide, 750; Agarose, 500; Dry Ice/Liquid Nitrogen, 1000		5,500
Plasticware/Glassware: Pipets/Pipet Tips, 2000; Flasks/Bottles, etc, 1000; Petri Dishes, 500; Disposables, 1500		5,000
TRAVEL	DOMESTIC	810
	FOREIGN	0
PATIENT CARE COSTS	INPATIENT	0
	OUTPATIENT	0
ALTERATIONS AND RENOVATIONS *(Itemize by category)*		
None		0
CONSORTIUM/CONTRACTUAL COSTS *(See instructions)*		
None		0
OTHER EXPENSES *(Itemize by category)*		
Service Contracts, 1000 Oligonucleotides, 1300 Xeroxing, 500	Computer Time, 1000 Protein Sequencing, 350	4,150

TOTAL DIRECT COST *(Enter on Page 1, Item 10a)* → $ 64,499

B. SUPPLEMENTAL INFORMATION REGARDING *ITEMS* IN THE PROPOSED BUDGET FOR THE NEXT PERIOD WHICH REQUIRE EXPLANATION OR JUSTIFICATION.*(SEE INSTRUCTIONS)*

PERSONNEL--SALARIES

Salaries that are less than the maximum allowable salaries are requested for Dr. Richard Ikeda. The balance of the salary will be paid from institutional support.

CONSULTANTS

Dr. Dwight Hall has agreed to voluntarily consult on possible experimental and genetic complications that might arise during the project--see the letter in the original competitive application.

TRAVEL

Domestic travel expenses are requested to allow one researcher to participate in one scientific conference per year. Participation in conferences will help us keep in touch with the current work of other investigators and will provide a forum for the critical discussion of our own data.

SECTION II CURRENT BUDGET PERIOD AND KEY PERSONNEL	FROM 03/01/90	THROUGH 02/28/91	GRANT NUMBER AI24905-03

The following pertains to your CURRENT PHS budget. This information will be used in determining the amount of support for the NEXT budget period.

A. CURRENT BUDGET	TOTAL ESTIMATED EXPENDITURES AND OBLIGATIONS (1)	ESTIMATED UNOBLIGATED BALANCE (2)	EXPLAIN ANY SIGNIFICANT ESTIMATED UNOBLIGATED BALANCE IN COLUMN 2 (3)
TOTAL DIRECT COSTS	67,362.86	10,899.14	See the continuation page
INDIRECT COSTS *(As provided)*	41,441.95	5,951.43	See the continuation page
TOTALS ——————————->	108,804.81	16,850.57	See the continuation page

B. CURRENT BUDGET PERIOD KEY PERSONNEL ENGAGED ON PROJECT *(Only if different)*

NAME, DEGREE(S) SSN	POSITION TITLE AND ROLE IN PROJECT DEPARTMENT AND ORGANIZATION	CHANGE IN % OF EFFORT
Not Applicable--No changes from the status proposed in the application for the current budget period.		

C. and D. *(Only if different)*
See instructions and provide the information required in Items C. and D. Use this page and continuation pages as necessary.

Not Applicable

SECTION III. PROPOSED KEY PERSONNEL FOR THE NEXT BUDGET PERIOD *(Only if different)*

NAME, DEGREE(S), SSN	POSITION TITLE AND ROLE IN PROJECT	DEPARTMENT AND ORGANIZATION
No new personnel		

Page 4--SECTION IIA (Continued)

A significant unobligated balance is estimated in Personnel Salaries and the associated Indirect Costs because the grant was funded and first activated during a period of previously arranged, temporary, institutional support. Since the FIRST grant allows for the carry over of unobligated funds, it was decided that it would be easier to leave the institutional support in place and to carry over the unobligated balances of the FIRST grant to cover research expenses and summer salary for Dr. Ikeda over the lifetime of the 5 year grant. The ability to carry over money to cover Dr. Ikeda's summer salary over the lifetime of the grant will permit Dr. Ikeda to forego summer teaching assignments and will allow him to devote his full effort to this project during the summer. It is expected that this will greatly improve the productivity of the project.

This carry-over of funds was done with the implicit understanding that (1) FIRST grants were designed to be flexible to cope with the needs of a young research group and that (2) the carry over of an unobligated balance under these circumstances would not reduce the total budget approved for the grant.

FOLLOW INSTRUCTIONS CAREFULLY. Incomplete, inaccurate, or ambiguous information about **OTHER SUPPORT** could lead to delays in the award. OTHER SUPPORT to be listed here refers to all current or requested support whether related to this application or not. If there are changes subsequent to submission, notify the Grants Management Official named on the Notice of Grant Award.

For each of the key personnel named on page 4, list, in three separate groups: (1) **all currently active support; (2) all applications and proposals pending review or funding; and (3) applications and proposals planned or being prepared for submission.** Include all Federal, non-Federal (e.g., for-profit, pharmaceutical, foundations), and institutional research, training, and other grant, contract, and fellowship support at the applicant organization and elsewhere. If part of a larger project, identify the principal investigator/program director and provide the data for both the parent project and the subproject. If none, state "none."

For each item give: (a) the source of support, identifying number and title; (b) percentage of appointment on the project; (c) dates of entire project period; (d) annual direct costs; (e) a brief description of the project; (f) whether the item overlaps, duplicates, or is being replaced or supplemented by the present application; delineate and justify the nature and extent of any scientific and/or budgetary overlaps or boundaries; and (g) any modifications that will be made should this continuation award be made.

PRINCIPAL INVESTIGATOR/PROGRAM DIRECTOR:
(1) CURRENTLY ACTIVE SUPPORT: (a)

I) a. National Institutes of Health, NIAID, 5R29AI24905-02, "The Molecular Basis of Function of T7 RNA Polymerase;" b. RAI 50% Effort; c. 3/1/89-2/28/94; d. Average Annual Direct Costs = $62,985 per year.

II) a. National Institutes of Health, Biomedical Research Support Grant, RR07024-25, "The Cloning and Expression of Human Serum Transferrin;" b. RAI 10% Effort; c. 6/1/90-3/31/91; d. Annual Direct Costs = $3,500.

III) a. National Institutes of Health, NCI, N01-CM-87269, "The Synthesis of Cogeners and Prodrugs of Anti-AIDS Compounds;" b. RAI 5% Effort; c. 8/1/87-7/31/91; d. Annual Direct Costs = $2,250 (Consultant).

IV) a. National Science Foundation, DIR-9011409, "Assembly of a Core Facility For Biological and Biochemical Research--A Laboratory for Protein/Peptide Synthesis, Purification, and Characterization;" b. RAI 5% Effort; c. 7/1/90-12/31/92; d. Annual Direct Costs = $217,000 (50% Matching funds provided by Georgia Tech).

(2) Pending Support

I) a. Alfred P. Sloan Foundation Research Fellowship; b. RAI % Effort--Not Applicable; c. 2 years of support requested, submitted Oct. 15, 1989; d. Annual Direct Costs = $25,000; e. A grant of unrestricted funds to support the research of young investigators.

Graduate Research Assistant: Paul Bailey
(1) Current Support: None
(2) Pending Support: None

Graduate Research Assistant: Sakuntala Warshamana
(1) Current Support: None
(2) Pending Support: None

SECTION IV PROGRESS REPORT SUMMARY	GRANT NUMBER AI24905-03	
PRINCIPAL INVESTIGATOR OR PROGRAM DIRECTOR Richard A. Ikeda	PERIOD COVERED BY THIS REPORT FROM	THROUGH
APPLICANT ORGANIZATION Georgia Tech Research Corporation	03/01/91	02/29/92

TITLE OF PROJECT *(Repeat title shown in item 1 on first page)*
Molecular Basis of Function of T7 RNA Polymerase

(SEE INSTRUCTIONS)

I. PLANS FOR 1991-1992

The objectives and specific aims of our studies of T7 RNA polymerase are the same as those originally proposed at the time of our competitive review. The long term goals continue to be (A) to determine the relationship of structure and function in T7 RNA polymerase and (B) to relate structure/function in T7 RNA polymerase to the mechanisms for the temporal control of transcription in replicating T7 phage. In the next year we plan to:

1) Continue our studies of how promoter structure and sequence affect promoter strength by examining the formation of specific initiation and transcription complexes on T7 class II and class III promoters
2) Define the active structural domains of T7 RNA polymerase by characterizing promoter permissive T7 RNA polymerase mutants and
3) Characterize how interactions with other proteins might alter transcription by T7 RNA polymerase by studying the affect of purified gene product 3.5 on initiation, elongation, and termination by T7 RNA polymerase.

Specifically, during the 1991-1992 funding period we intend to publish our measurements of the kinetics of abortive initiation from the T7 class II and class III promoters, use footprinting and gel shift assays to identify the transcription complexes formed on T7 promoters, measure the efficiency of transcription from the natural T7 promoters, examine and characterize possible promoter permissive mutants of T7 RNA polymerase that have been selected by second site reversion, and characterize the purified gene product 3.5 that has been produced by recombinant methods. The experimental designs and methods to be used to pursue these objectives were previously described in the original proposal.

II. STUDIES CONDUCTED

During the past year we have made significant progress with our work in the three areas mentioned above.

1) In our studies of how T7 promoter structure and sequence affect promoter strength, Ms. Jane Clarke and Ms. An Chi Lin have examined the rate of formation of abortive initiation products as a function of promoter concentration. Working with the cloned T7 promoter, ϕ10, Ms. Clarke showed that in the presence of ATP and GTP promoter dependent RNA synthesis by T7 RNA polymerase gives a hexaribonucleotide. Ms. Clarke also demonstrated that this abortive hexamer accumulates over time, and that the rate of production of this hexamer can be measured as a function of T7 promoter concentration and T7 RNA polymerase concentration. As expected, the maximum rate of hexamer synthesis was dependent

on RNA polymerase concentration, but the data also showed that the promoter concentration that results in half the maximum rate of hexamer synthesis (designated as M/2) is independent of RNA polymerase concentration. Ms. Clarke and Ms. Lin measured maximum rates of abortive synthesis and M/2 concentrations for three cloned class III promoters (ϕ13, ϕ10, and ϕ6.5) and three cloned class II promoters (ϕ3.8, ϕ1.3, and ϕ1.1B). The class III promoters are all identical to the 23 base pair consensus sequence for a T7 promoter, while each of the class II promoters differs from the T7 consensus sequence at 3 or 4 bases. Ms. Clarke and Ms. Lin found that the maximum rates of abortive synthesis and the M/2 concentrations were useful for comparing promoter strengths. The M/2 concentrations showed that on supercoiled templates the class II promoters ϕ1.3 and ϕ1.1B acted like the three class III promoters, while on linear templates it was clear that the three class II promoters were much weaker than the three class III promoters. These observations may explain why other investigators see no class differences in cloned T7 promoters *in vivo*, while T7, itself, shows more transcription from class III promoters than class II promoters; furthermore, this may suggest that the T7 genome is not negatively supercoiled *in vivo*.

2) To obtain promoter permissive mutants of T7 RNA polymerase Ms. Sakuntala Warshamana has been working on constructing a selection system for identifying possible T7 RNA polymerase mutants.

The selection scheme relies on a two plasmid, T7 expression system. Ms. Warshamana has cloned the *tet* and *cat* genes under the T7 ϕ10 promoter (pT7-5Tet and pT7-5Cat), and has shown that these plasmids stably confer tetracycline resistance or chloramphenicol resistance to *E. coli* harboring and expressing T7 RNA polymerase from the gene 1 clone pGP1-5. Once she had shown that the expression system was stable and that antibiotic resistance was only expressed in the presence of T7 RNA polymerase, Ms. Warshamana replaced the ϕ10 promoter in the *tet* and *cat* plasmids with a synthetic promoter that contained random mutations. Inactive promoters were then selected from this library of mutants. To date, Ms Warshamana has isolated approximately 30 separate clones with inactive promoters.

To obtain mutants of T7 RNA polymerase, Ms. Warshamana treated the T7 RNA polymerase clone with hydroxyl amine to randomly mutagenize the RNA polymerase gene. The mutagenized RNA polymerase plasmid and the *tet* plasmids with inactive promoters were then cotransformed into *E. coli*, and the culture was plated on tetracycline selection plates. Ms. Warshamana recently identified 5 different mutagenized RNA polymerase clones that express tetracycline resistance from inactive T7 promoters. Although this is a promising result, we still need to confirm that the observed tetracycline resistance is caused by usage of the mutant T7 promoter by a mutant T7 RNA polymerase.

3) The T7 3.5 protein (or gp 3.5) has been implicated in the regulation of T7 transcription. The characterization of this interesting protein is a project being pursued by Mr. Paul Bailey. To obtain the 3.5 protein, Mr. Bailey has cloned T7 gene 3.5 behind the inducible lambda promoter p_L. In this system, 3.5 protein is the major protein produced in *E. coli* after induction of the lambda promoter. A scheme to purify the 3.5 protein has been devised by Mr. Bailey. To purify gp3.5, the protein that passes through both DEAE-cellulose and phosphocellulose is collected. This pool is then applied to a rotofor and is purified via preparative isoelectric focusing; the remaining impurities are then removed on a sephadex column. The procedure yields approximately 6 mg of protein from a 3 liter culture. The purity of the protein is

greater than 98% and the sequence of the first 30 amino acids of the protein matches the sequence predicted from the DNA sequence of the gene. We are presently investigating the activity of the purified protein.

III. HUMAN SUBJECTS

Not Applicable.

IV. VERTEBRATE ANIMALS

Not Applicable

V. PUBLICATIONS

None--Two manuscripts in preparation

CHECKLIST	GRANT NUMBER AI24905-03

Check the appropriate boxes and provide the information requested. Make this page the last page of the signed original of the application. **Do not attach copies of this page to the duplicated copies of the application.**

ASSURANCES

The following certifications described below are made by checking the appropriate boxes and verified by the signature of the OFFICIAL SIGNING FOR APPLICANT ORGANIZATION on the FACE PAGE of the application.

a. **Delinquent Federal Debt.** ☒ No ☐ Yes (If "Yes," attach explanation.)

Before a grant award can be made, the applicant organization must certify that it is not delinquent on the repayment of any Federal debt. The certification applies to the applicant organization, not to the person signing the application as the authorized representative nor to the principal investigator/program director.

Examples of Federal debt include delinquent taxes, audit disallowances, guaranteed or direct student loans, FHA loans, business loans, and other miscellaneous administrative debts. For purposes of this certification, the following definitions of "delinquency" apply:

- For direct loans and fellowships (whether awarded directly to the applicant by the Federal Government or by an institution using Federal funds), a debt more than 31 days past due on a scheduled payment. (Definition excludes "service" payback under a National Research Service Award.)
- For guaranteed and insured loans, recipients of a loan guaranteed by the Federal Government that the Federal Government has repurchased from a lender because the borrower breached the loan agreement and is in default.
- For grants, organizations in receipt of a "Notice of Grants Cost Disallowance" which have not repaid the disallowed amount or which have not resolved the disallowance. (Definition excludes disallowances in an "appeal" status.)

Where the applicant discloses delinquency on debt to the Federal Government, the PHS shall (1) take such information into account when determining whether the prospective grantee organization is responsible with respect to that grant, and (2) consider not making the grant until payment is made or satisfactory arrangements are made with the agency to whom the debt is owed. Therefore, it may be necessary for the PHS to contact the applicant before a grant can be made to confirm the status of the debt and ascertain the payment arrangements for its liquidation. Applicants that fail to liquidate indebtedness to the Federal Government in a businesslike manner place themselves at risk of not receiving financial assistance from the PHS.

b. **Debarment and Suspension.** ☒ No ☐ Yes (If "Yes," attach explanation.)

Before a grant award can be made, the applicant organization must certify, among other things, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency. Subawardees, that is, other corporations, partnerships, or other legal entities (called "lower tier" participants), must make the same certification to the applicant organization concerning their covered transactions. Please refer to the pertinent DHHS implementing regulations, Title 45 Code of Federal Regulations Part 76, for complete certification requirements.

c. **Drug-Free Workplace.** ☒ Yes ☐ No (If "No," attach explanation.)

Before a grant award can be made, the applicant organization must certify that it will provide a drug-free workplace. The main points of the certification require the applicant organization to:

- Publish a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violation of such prohibition;
- Establish a drug-free awareness program;
- Require that each employee engaged in the performance of a grant or contract be provided a copy of the published statement;
- Notify the employee that as a condition of employment, the employee will abide by the terms of the statement;
- Notify the PHS awarding component of any employee convicted of a drug violation occurring in the workplace; and
- Require any employee who is convicted of a drug offense occurring in the workplace to participate in a rehabilitation program.

Please refer to the pertinent DHHS implementing regulations, Title 45 Code of Federal Regulations Part 76, for complete certification requirements.

INDIRECT COST CALCULATION

Indicate the applicant organization's most recent indirect cost rate established with the appropriate DHHS Regional Office, or, in the case of for-profit organizations, the rate established with the appropriate PHS Agency Cost Advisory Office. Indirect costs will not be paid on foreign grants, construction grants, grants to Federal organizations and grants to individuals, and usually not on conference grants. Follow any additional instructions provided for Research Career Development Awards, Institutional National Research Service Awards, and specialized grant applications.

☐ DHHS Agreement Dated: _____ ☐ No Indirect Costs Requested

☒ No DHHS Agreement, but rates established with Office of Naval Research DATE 6/1/90

***CALCULATION**

Enter proposed budget period:

Amount of Base $ 64,499 x Rate Applied 62.5 % = Indirect Costs $ 40,312

Add to total direct costs from page 2 and enter new total on FACE PAGE, Item 10b

*Check appropriate box(es)

☐ Salary and wage base ☒ Modified total direct costs base ☐ Other base (Attach explanation)

☐ Off-site, other special rate, or more than one rate involved (Attach explanation)

*This is the required last page of the application.

CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Certified by:

[signature] 12/19/90

Signature Date

CONTRACTING OFFICER

Title

GEORGIA TECH RESEARCH CORPORATION

Institution

Grant Proposal Number:

AI-24905-03